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EPA's
Draft Report on the Environment
Technical Document

United States Environmental Protection Agency
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This document is an external draft for review purposes only and does not constitute Agency policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

This report is dedicated to the memory of our friend and colleague, Dr. Felicity (Kim) Devonald. Kim was a tireless advocate for the development and use of environmental indicators at EPA, pioneering our efforts to provide useful and reliable descriptions of environmental status and trends.

Kim joined EPA in1984. Since the early 1990s, she was instrumental in Agency explorations of the concept of environmental indicators. Her efforts led to the Agency's first published proposals of fully developed environmentally based indicators (from public workshops) in the mid-1990s. She was working on material related to the state of science of these indicators almost to the moment of her death, and much of that material has been incorporated into this Technical Document.

Without Kim's example and her early efforts, this report would be far less than it is.

Table of Contents

Preface

From EPA's Science Advisor and Chief Information Officer

The Environmental Protection Agency (EPA) has been a world leader in developing and implementing solutions to the environmental problems in our air, water and land. Through the years, working together with other Federal Agencies we have built a significant body of science and knowledge that has influenced national and international public policy, and has raised our awareness of the value of our environment. Yet, even with the enormous wealth of understanding and information that we have today, there are still gaps in our ability to adequately monitor many key indicators in the cascades of events that link our efforts to protect the environment to the ultimate outcomes we seek: cleaner air, purer water, better protected land, and improved human health and ecological condition. To close that gap, we need both scientifically sound indicators and the national data to support them.

With the publication of the EPA Draft Report on the Environment, including this comprehensive Technical Document, EPA has launched a multi-year effort to improve the state of the science and our knowledge of the state of the environment. This effort addresses indicators, monitoring data and models for better tracking the impacts of our activities on the environment. This document includes indicators that EPA has monitored for many years, including ambient levels of pollutants in air, water and land. However, we recognize that protecting the environment ultimately is achieved in terms of human health and ecological condition, and these two chapters serve as anchors for the entire report.

The last sections of each chapter of this report describe challenges and data gaps associated with its particular subject area. Several general issues have emerged that we will address in the coming months and years.

Shifting to an "Outcomes" Framework

Identifying environmental "outcomes" such as better human health and ecological condition requires a significant shift in how the Agency frames questions and issues about environmental quality. The first three chapters of this report; Cleaner Air, Purer Water, and Better Protected Land, ask questions that tend to follow traditional Agency efforts to prevent, control, or remediate the effects of pollution. For example:

- What is the quality of outdoor air in the United States?
- What are pressures to water quality?
- What is the extent of developed land?

The final two chapters on human health and ecological condition, ask questions about outcomes, for example:

- What are the trends for cancer?
- What is the ecological condition of coasts and oceans?

To understand how EPA's mission affects these outcomes, both directly and indirectly, requires indicators not only of pollutant releases and ambient conditions, but indicators that span the chain of events between the release of a pollutant, exposure of people, plants and animals, and the chain of events from dose to effects. In the case of human health, factors such as level of health care, natural disease rates, and actual human exposures must be factored into an indicator strategy. For ecological systems, indicators are needed that better track hydrology, features of the landscape, natural disturbances, ecological processes, and other factors that interact with pollutants to ultimately determine ecosystem condition.

Availability of Indicators

For a few of the questions in the report, indicators were identified that are available at the national level. More frequently, however, we found that promising indicators have been developed and measured for limited geographic areas, or for a part of the causal chain. Further exploration of the relationship between measurements used for assessments and measurements used for diagnosis of causal factors also is needed. Development and testing of national indicators has been a high research priority for EPA's Office of Research and Development.

Availability of Data

For each of the indicators, we attempted to gather data of sufficient quality and coverage to support national reporting, both within and outside the Agency. Generally, the available data were too limited in place and time to describe national trends, or even to provide a national snapshot of conditions. Because the data from different organizations often serve a broad range of purposes, even when data are available nationally, gaps remain in the spatial, temporal and phenomenological coverage needed to track the outcomes of many of EPA's programs. Monitoring networks established to address specific issues must be better integrated through common definitions, designs, methods, and information systems.

Collaborating for the Future

With this draft as a starting point, we look forward to collaborating with federal and state agencies to promote integrated and coherent approaches and mechanisms for reporting on the state of the environment. Following the release of this report, we will be working closely with scientists from other federal and state agencies and the academic community to explore how best to improve our ability to measure and assess environmental conditions.

We invite all of our stakeholders to lend their creativity and commitment in the months and years ahead as they join us in meeting Administrator Whitman's challenge to focus our resources on the areas of greatest concern and to manage our work to achieve measurable results.

Paul Gilman, Ph.D.
Science Advisor and Assistant Administrator for Research and Development

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Introduction

"When I leave office, I want to be able to say that America's air is cleaner, its water is purer, and its land better protected than it was when I arrived. As we seek to achieve this goal, EPA needs to be accountable for our stewardship."
Christine Todd Whitman, Administrator, U.S. Environmental Protection Agency

In November 2001, EPA Administrator Christine Todd Whitman directed the Agency to bring together its national, regional and program office data to produce a report on the "state of the environment." The report would represent the first step of the Environmental Indicators Initiative, a multi-year process that would ultimately allow future EPA administrators to better measure and report on progress toward environmental and human health goals and to ensure the Agency's accountability to the public.

To produce this report, EPA's Office of Research and Development (ORD) and Office of Environmental Information (OEI) led a collaborative effort to identify the key questions to be answered by the report, to identify an initial set of indicators, and to develop a process for reviewing and selecting the indicators and supporting data to be included in the final report. This task was accomplished thanks to the efforts of numerous EPA staff, representatives from other federal agencies, representatives from the states and tribes, and external advisors and reviewers. The indicators and supporting data used in this report were generated by EPA and other federal, state, tribal, regional, local, and non-governmental organizations. The Council on Environmental Quality in the Executive Office of the President was helpful throughout in coordinating interagency contributions to the project.

EPA's *Draft Report on the Environment* (ROE) consists of this *Technical Document* and a version of the report for general reading. These reports pose national questions about the environment and human health and answer those questions wherever scientifically sound indicators and high-quality supporting data are available. The reports both pose questions and present indicators related to:

- Cleaner Air
- Purer Water
- Better Protected Land
- Human Health
- Ecological Condition

This *Draft Technical Document* discusses the limitations of the currently available indicators and data, and the gaps and challenges that must be overcome to provide better answers in the future.

For a few indicators, data are available that are truly representative of the entire nation. For other indicators, data currently are available for only one region (such as the East Coast or the Northwest), but the indicator could obviously be applied nationally if the data were available. Based on the availability of supporting data, indicators that were selected and included in this report were assigned to one of two categories:

- **Category 1** –The indicator has been peer reviewed and is supported by national level data coverage for more than one time period. The supporting data are comparable across the nation and are characterized by sound collection methodologies, data management systems, and quality assurance procedures.
- **Category 2** –The indicator has been peer reviewed, but the supporting data are available only for part of the nation (e.g., multi-state regions or ecoregions), or the indicator has not been measured for more than one time period, or not all the parameters of the indicator have been measured (e.g., data has been collected for birds, but not for plants or insects). The supporting data are comparable across the areas covered, and are characterized by sound collection methodologies, data management systems, and quality assurance procedures.

This report is part of EPA's continuing effort to identify, improve, and utilize environmental indicators in its planning, management, and public reporting. EPA's specific strategies and performance targets to protect human health and the environment are presented in the Agency's strategic and annual plans. These planning and performance documents, together with the questions, indicators and data presented in these reports, will allow EPA to better define and measure the status and trends in environment and health, and to better measure the effectiveness of its programs and activities.

This technical report is a draft, intended to elicit comments and suggestions on the approach and findings. To learn more about EPA's *Draft Report on the Environment* and the Environmental Indicators Initiative, and to provide comments and feedback, please visit <http://www.epa.gov/indicators/>.